Remarks

This paper is a preliminary amendment filed before a first action has been received in this application. This application is a continuation-in-part of U.S. Serial No. 10/100,666, in which two Office actions have been received. The applicants will therefore show that the presently pending claims (14-30) are patentable in view of the prior art applied and the reasons provided in the parent application.

35 U.S.C. § 103 (Non-obviousness)

Claims 14-17

Claims 14-17 in this case are non-obvious in view of the Hunter and Gillespie references, for the reasons provided below.

The Hunter reference relates to the production of silicon carbide from conventional chemical sources (not human or animal remains), and does not disclose the formation of diamond.

Claims 14-17 each recite, or incorporate by reference to earlier claims, at least three steps that are not disclosed in the Hunter reference:

a. *providing cremated human or animal remains;*
b. *collecting residual carbon from said cremated human or animal remains; and*
c. *converting said residual carbon to diamond.*

Thus, the Hunter reference is not pertinent to the claimed invention.

The Gillespie reference is a general newspaper article in which Gillespie, the reporter, states, in relevant part:

> [A] recent ad in the Sun City Daily News-Sun [] is soliciting customers for a deal to transform the ashes of deceased loved ones into gem-quality diamonds.
> * * *
>
> Their idea is technically possible....

The Gillespie disclosure, however, does not provide a reasonable expectation of success to a person of ordinary skill in the art, as that person would not believe that the invention would work. The person of ordinary skill would not believe that diamonds can be made from cremated human or animal remains, because cremated human or animal remains are understood to contain almost no carbon. Carbon is the single essential ingredient of a diamond, which is essentially pure carbon.

Without a reasonable expectation of success, a proposed combination of references does not establish obviousness, and does not support a proper rejection.

> "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure."

§ 2142 MANUAL OF PATENT EXAMINING PROCEDURE, 8th ed., Rev. 1 (Feb. 2003) [MPEP], Ch. 2100, p.124.

Cremation processes are carried out in a manner that is understood in the art to remove virtually all the burnable material, including carbon. For example, see the cremation references cited in paragraph 0026 of the parent application, 2003/0017932A1, published January 23, 2003. These references indicate that during cremation the human or animal remains are burned to the maximum possible extent by heating the human or animal remains to a high temperature for a long time in an abundance of oxygen, forming ashes.

> Once combustion is under way, little fuel need be supplied through either of the burners 57 or 74, but it is important to make sure of an abundance of air in the afterburner chamber all the time to make sure that all that can be burnt is burnt. Thus, the changes in velocity lead to the formation of a fireball in the corner portion 76, and the thorough mixing at that point ensures that all combustible particles are thoroughly burned.

U.S. Pat. No. 4,603,644, Col. 4, lines 44-51.

> When the gases and particles reach the afterburner chamber, they are mixed with an excess of air; because the easily combustible particles are still present an environment is created where even the hardest-to-burn particles may be oxidised.

U.S. Pat. No. 4,603,644, Col. 1, lines 18-24.

> The whole process of cremation of a typical coffin and its contents takes several hours, from placing the coffin in the chamber 50 until the calcified ashes are sufficiently broken down that they can be reduced to a fine powder.

U.S. Pat. No. 4,603,644, Col. 3, lines 8-12.

> In the unit shown in the drawings, the second stage of cremation takes place in the ash trough 67. The ash trough 67 is located, in the cremator of the invention, at the very hottest place, in that it is in the coffin chamber, and is surrounded not by outside walls but by the afterburner chamber 70, and by the coffin chamber 50. Only over the small area at its very edges is the ash trough 67 close to the relatively cooler outer walls, i.e., the side walls 36, 37, of the cremator 30.

U.S. Pat. No. 4,603,644, Col. 3, lines 20-28.

> In the invention, the access port by which the fully consumed ash may be removed from the incinerator is in the side of the incinerator....

U.S. Pat. No. 4,603,644, Col. 1, lines 39-42.

> The secondary combustion tube 20 is provided with second burner 60 and associated air inlet jet 62, which second burner arrangement ensures as far as possible 100% combustion within the secondary combustion tube 20 of gases, particulates and other remnant combustible matter carried in the waste gases exhausted from the primary combustion chamber 10. In FIG. 2 the general direction of circulation of gases within the cremator is indicated by arrows.

U.S. Pat. No. 5,957,065, Col. 4, lines 42-51.

> Over recent years in many countries of the world legislation has been introduced which places even more stringent requirements on the content of waste gases emitted from cremator installations, particularly with respect to ensuring complete combustion of gases and fine particulates entrained therein exiting from the combustion chamber(s) before being released from the cremator via an exhaust flue. Laws now generally required that the waste gases exhausted from the combustion chamber(s) are retained in a retention zone heated to a temperature of at least 850.degree. C. (as is the case in Europe) for a period of at least two seconds, before being allowed to pass to the exhaust flue and released into the atmosphere. This period of retention of the waste gases in the heated retention zone ensures complete combustion of gases and any remnant or fine particles

> entrained therein which may not have been fully burned during the main combustion process.

U.S. Pat. No. 5,957,065, Col. 1, lines 36-52.

> There are various known designs of cremators of the type having a primary combustion chamber for receiving through a charge door thereof a coffin or other object for cremating by means of a burner directed into the primary combustion chamber, and a secondary combustion chamber, separate from the primary combustion chamber, through which are passed the gases, particulates and other exhaust materials from the primary combustion chamber to ensure maximum burning of combustible material during the cremation process.

U.S. Pat. No. 5,957,065, Col. 1, lines 16-25.

> Such dual combustion chamber furnaces are advantageous over known single combustion chamber furnaces, because of the higher degree of burn-off of combustible material from the coffin or other object being cremated. In fact, nowadays such dual combustion chamber cremators are generally essential in order to satisfy legal, environmental and aesthetic requirements as regards waste emissions from cremator installations.

U.S. Pat. No. 5,957,065, Col. 1, lines 27-35.

> Preferably the interior of the retention chamber is maintained at a temperature of at least about 850.degree. C....

U.S. Pat. No. 5,957,065, Col. 3, lines 17-20.

> The temperature at which the primary and secondary combustion chambers 10 are operated will typically be of the order of up to 1300.degree. C. as is generally the case with known cremator designs. As hot waste gases from primary combustion chamber 10 pass up and out thereof and into secondary combustion tube 20 via mixing chamber 11, intimate mixing of the exiting gases and incoming air from the second burner arrangement 60, 62 occurs, which promotes optimum secondary combustion within the secondary combustion chamber 20.

U.S. Pat. No. 5,957,065, Col. 4, lines 43-49.

Over and over, the above prior art emphasizes completely burning the combustible material from the human or animal remains during the cremation process, and indicates that this goal is achieved. One of ordinary skill in the art therefore would not expect any carbon to be scavenged from cremated human or animal remains.

The (first) Declaration of Robert W. Froberg filed in the parent application provides further evidence that obtaining carbon from cremated human or animal remains is a surprise. Paragraph 1 of the Declaration establishes Dr. Froberg as an expert in carbon recovery, since he has a Ph.D. in material science and extensive work experience, including issued patents, in this area, as well as experience in growing industrial diamonds. Paragraph 13 of the of the Froberg Declaration indicates that one skilled in the art would not expect to obtain carbon from ashes – the product of cremation (see U.S. Pat. No. 4,603,644, Col. 3, lines 8-12). Paragraph 18 of the Froberg Declaration indicates failed attempts by others to obtain suitable carbon to form a gemstone from human or animal remains. Paragraph 21 of the Froberg Declaration indicates that Dr. Froberg did not himself believe that carbon useful to make a gemstone could be recovered from human or animal remains, before learning about the present invention. This evidence is confirmed by the published prior art discussed above that would lead a person of ordinary skill in the art to reject the possibility that diamond gemstones could be formed from cremated human or animal remains.

The Grizenko Declaration cited during the prosecution of the parent application indicates that Mr. Grizenko, too, has intimate familiarity with synthetic diamond production (Par. 1). Mr. Grizenko confirms, in Paragraph 13, "The Gillespie article makes several references to the use of 'ashes' to make 'diamonds.' However, the use of the term 'ashes' in the fields of carbon purification and diamond production indicates that no useable form of carbon is present after cremation. Without carbon or a process to extract carbon from the ashes, a diamond cannot be produced."

The paper entitled Second Declaration of Robert W. Froberg filed with this response provides further evidence that obtaining carbon from cremated human or animal remains is a surprise. Dr. Froberg's experimentation reported in his Second Declaration shows that during the carbon purification process the ash (non-carbon) content of the cremated remains reacts with and removes carbon from either the contents of the crucible or from the wall of the crucible itself, which is also made of graphite. See, for example, Paragraph 13. The ash is also expected to react with the residual carbon in the remains themselves, thus preventing the residual carbon from being collected. See, for example, Paragraph 13.

The Shinomiya et al. patent cited in the prosecution of the parent application merely recites, "The term 'carbonaceous materials' includes ... bones...." Col. 3, lines 15-17. This reference does not prevent patentability of the present claims 14-17, because the cremation references discussed above clearly indicate that the human or animal remains, which of course include bones, are subjected to strong oxidizing conditions that reduce the bones to ash. Ash is not cited as a carbonaceous material, which further lends support to the expectation of a person of ordinary skill in the art that carbon cannot be extracted from ash.

The Knox et al. patent cited in the prosecution of the parent application refers to "carbon formed by pyrolysis of bone" at col. 1, line 6. However, the pyrolysis is not carried out in the presence of oxygen, contrary to conventional cremation. See, e.g., Example 1, which states, "On further heating to 350°C. and subsequently to 900°C. in a stream of oxygen-free nitrogen for 16 hours, pyrolysis of the organic material to carbon occurs, resulting in a completely black composite material." Col. 4, lines 27-31.

Therefore, the present invention of claims 14-17, in which carbon is derived from human or animal remains after cremation, produces a surprising result that would not be expected by those of ordinary skill in the art. The rejection made in the parent application, based on Hunter and Gillespie, therefore should not be repeated in this application.

Moreover, claim 15 is further distinguished from the prior art by its requirement that the carbon "collecting step is carried out by adding additional carbon to said cremated human or animal remains and purifying said cremated human or animal remains in the presence of said additional carbon." No such process is disclosed in the Gillespie or Hunter prior art. Dr. Froberg's enclosed Second Declaration provides evidence that adding sacrificial carbon to the ash increases the amount of carbon retrieved from the original remains. See, for example, Paragraphs 9, 10, 11, and 14.

Further, claim 16 states, "said converting step is carried out under conditions effective to form a diamond gemstone." Gillespie does not teach that a gemstone should be produced, instead stating, "We're not going to claim that this is going to be any valuable piece of diamond, and "These diamonds are not for jewelry...."

In addition, claim 17 further recites, "faceting said diamond gemstone." Gillespie teaches away from faceting the stones proposed in that article, stating, "[C]ustomers probably

would have to agree not to introduce these synthetic diamonds into the gem-diamond market .... * * * To reduce that likelihood, the polished crystals would remain uncut." The statement that, "These diamonds are not for jewelry," also teaches away from the invention of claim 17.

Claims 18-30

Claims 18-30 each recite, or incorporate by reference to earlier claims, at least three steps that are not disclosed in the Hunter reference:

a. *providing at least partially cremated human or animal remains;*
b. *collecting residual carbon from said at least partially cremated human or animal remains; and*
c. *converting said residual carbon to diamond.*

These steps are not obvious from the Gillespie reference either, which does not state that the cremation process can or should be modified, or that partially cremated human or animal remains should be removed from the cremating oven. Therefore, the present invention of claims 18-28 is not obvious in view of this disclosure.

Claims 19-21 add additional limitations to the above, and thus are patentable for the additional reasons stated in connection with claims 15-17.

Claims 24-28 add the limitation of cremating human or animal remains "under conditions effective to conserve residual elemental carbon," and claims 25-28 recite some representative conditions contemplated to conserve carbon. The Hunter and Gillespie prior art provide no teaching or suggestion of the recited novel cremation conditions or of modifying the cremation conditions to conserve carbon.

Claim 29 recites separation of part of the remains and cremation of a separated part with reduced access to oxygen. The cited prior art does not disclose that cremation should be

conducted to any degree with restricted access to oxygen, or differently for different portions of the remains.

Claim 30 recites cremation of remains in two steps, interrupting the cremation to remove carbon then finishing the cremation. The prior art does not disclose such a two-step cremation, or removing remains while cremation is incomplete.

Therefore, claims 18-30 are patentable in view of the cited prior art as well.

No New Matter

The amended claims do not introduce any new matter. The new claims are supported as follows:

Claim Language	Support in Application As Filed (Representative Page / Line)
14. (new): A method of making synthetic diamond comprising:	Page 8, second paragraph of detailed description.
14a. providing cremated human or animal remains; 22. (new) The method of claim 18, wherein said step of providing at least partially cremated human or animal remains is carried out by obtaining at least partially cremated human or animal remains from a source.	Page 11, first full paragraph
b. collecting residual carbon from said cremated human or animal remains;	Page 11, first full paragraph
Claims 14c and 18c and c. converting said residual carbon to diamond.	Page 12, first two paragraphs
15. (new) The method of claim 14, wherein said collecting step is carried out by adding additional carbon to said cremated human or animal remains 19. (new) The method of claim 18, wherein said collecting step is carried out by adding additional carbon to said at least partially cremated human or animal remains	Page 11, first full paragraph
15, cont'd. and purifying said cremated human or animal remains in the presence of said additional carbon. 19, cont'd. and purifying said human or animal remains in the presence of said additional carbon.	Page 11, first full paragraph
16. (new) The method of claim 14, wherein said converting step is carried out under conditions effective to form a diamond gemstone. 20. (new) The method of claim 18, wherein said converting step is carried out under conditions effective to form a diamond gemstone.	Page 12, last paragraph

Claim Language	Support in Application As Filed (Representative Page / Line)
17. (new) The method of claim 16, further comprising faceting said diamond gemstone. 21. (new) The method of claim 18, further comprising faceting said diamond gemstone.	Page 12, last paragraph
18. (new): A method of making synthetic diamond comprising:	Page 8, second paragraph of detailed description.
a. providing at least partially cremated human or animal remains;	Paragraph bridging pages 4-5; pages 8-11.
b. collecting residual carbon from said at least partially cremated human or animal remains;	Pages 8-11
and c. converting said residual carbon to diamond.	See claim14c above
23. (new) The method of claim 18, wherein said step of providing at least partially cremated human or animal remains is carried out by treating human or animal remains in a cremation oven.	Pages 8-11
24. (new) The method of claim 23, wherein said treating step is carried out under conditions effective to conserve residual elemental carbon.	Pages 9-11
25. (new) The method of claim 24, wherein said conditions effective to conserve residual elemental carbon comprise cremating at least a portion of the available human or animal remains in a closed vessel placed within a cremating oven.	Pages 9-11
26. (new) The method of claim 24, wherein said conditions effective to conserve residual elemental carbon comprise positioning the human or animal remains in a cremating oven so that at least one of the head and chest area is not positioned directly underneath the main burner.	Paragraph bridging pages 8-9.
27. (new) The method of claim 24, wherein said conditions effective to conserve residual elemental carbon comprise using a cremation temperature of approximately 1000 degrees Fahrenheit (5×10^2 degrees Celsius).	"The body is generally burned at a temp-erature that can range from approximately 1000 degrees Fahrenheit up to approxi-mately 1800 degrees Fahrenheit. In order to facilitate higher airborne particulate

Claim Language	Support in Application As Filed (Representative Page / Line)
	carbon levels, a higher gas to air ratio is used so that the gas burners cremate the body at the low end of the temperature range." Publ. Appl. 2003/0017932A1, par. 0026, incorporated by reference at pages 1-2
28. (new) The method of claim 24, wherein said conditions effective to conserve residual elemental carbon are provided by dividing human or animal remains to be cremated into at least two portions, and cremating at least one said portion under conditions effective to conserve elemental carbon.	Pages 9, last paragraph, to 11.
29. (new) The method of claim 24, wherein said conditions effective to conserve residual elemental carbon are provided by dividing human or animal remains to be cremated into at least two portions, and cremating at least one said portion in at least partial isolation from oxygen, compared to at least one other said portion of the human or animal remains.	Pages 9, last paragraph, to 11.
30. (new) The method of claim 18, wherein said at least partially cremated human or animal remains are partially cremated,	Pages 9, last paragraph, to 11.
further comprising the step, after collecting human or animal remains comprising residual carbon from said partially cremated human or animal remains, of further cremating said partially cremated human or animal remains.	Paragraph bridging pages 13-14.

Conclusion

For the stated reasons, claims 18-30 are patentable and should be allowed immediately.

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